APPENDIX A

ANNOTATED BIBLIOGRAPHY BY ABIGAIL HOOK

Annotated References
WRIA 20 Level I Technical Assessment
Abigail Hook
6/10/04

WRIA 20

Agee, J.K. 1994. Catastrophic forest disturbance on the Olympic Peninsula. Research paper prepared for Rayonier Inc. P.O. Box 200 Hoquiam, WA.
This paper outlines the historical fire and windthrow events on the western Olympic Peninsula.

Benda, L. C. Veldhuisen and J. Black. 2003. Debris flows as agents of morphological heterogeneity at low-order confluences, Olympic Mountains, Washington. Geological Society of America Bulletin: Vol. 115, No. 9, pp. 1110-1121.
Field data and information from study sites indicates how variation in debris flow volume and composition, stream energy, and valley width at the point of deposition influence the relationship between low-order confluences and channel morphology.

Boyce, J.S. 1929. Deterioration of wind-thrown timber on the Olympic Peninsula, Washington. USDA Tech. Bull. 104. Washington DC.
Reviews the effects of the 1921 windstorm and subsequent longevity of the wood on the ground. Examines the response of different species to rot and fungus typical of blowdown

Cummans, J.E., M.R. Collins, and E.G. Nassar. 1975. Magnitude and frequency of floods in Washington. US Geological Survey Open-File Report 74-336.

DOE. 1992. Statewide Water Quality Assessment (305(b) Report). Pub. No. 92-04. Washington Department of Ecology. Olympia, WA.
The purpose of the Section 305(b) report is to present to the U.S. Congress and the public the current conditions of the state's waters. Section 305(b) of the federal Clean Water Act requires each state to prepare a water quality assessment report every two years. The EPA compiles the information from the state reports and prepares a summary for Congress on the status of the nation's waters. The 2000 Washington State 305(b) report has been prepared in accordance with EPA guidelines for preparation of 305(b) reports. The difference between the 305(b) report and the 303(d) list is that the 305(b) report is a state-wide assessment where the 303(d) list reports just on the impaired waters of the state.

DOE. 1992. Water quality standards for surface waters of the State of Washington. WAC 173-201A. Water Quality Program, Olympia.
This code outlines standards put into place consistent with public health and public enjoyment of the waters and the propagation and protection of fish, shellfish, and wildlife, pursuant to the provisions of chapter 90.48 RCW (water pollution control).

DOE. 1998. Water Quality in Washington State (Section 303(d) of the Federal Clean Water Act). Washington Department of Ecology, Olympia, WA.
Section 303(d) of the federal Clean Water Act requires Washington State periodically to prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years.

Gerstel, W. 1999. Deep-seated landslide inventory of the west-central Olympic Peninsula. Washington Division of Geology and Earth Resources Open File Report 99-2.
Gertsel inventories landslides from La Push to the Queets River, bounded to the west by Olympic National Park. The deep-seated landslide inventory and subsequent geologic information is intended to be used as a landslide hazard map for land-use planners and land managers trying to identify hazardous areas. The landslides were identified through aerial-photo interpretation and ground verified. They were then digitized into a GIS system.

Hauschild, W.L. and D.E. LaFrance. 1978. Low flow characteristics of streams on the Olympic Peninsula, Washington. US Geological Survey Open-File Report 77-812.
The purpose of this study was to determine (for the benefit of water users and managers) the magnitude, frequency and normal time of occurrence of low flows of streams on the Olympic Peninsula. The magnitude and frequency of 7-day low flows were estimated for 116 stations either from frequency analyses of data at long-term stations or from correlation of data at a short-term station with data at an appropriate long-term station.

Huntington, C.W., W. Nehlsen and J. Bowers. 1996. Healthy native stocks of anadromous salmonids in the Pacific Northwest and California. Fisheries (21)3: 6-13.
This report summarizes a survey of healthy native stocks of anadromous salmonids in the Pacific Northwest and California. The information was gathered using a questionnaire approach combined with spatial analysis to describe the status and distribution of stocks considered to be in relatively good condition.

Lestelle, L.C., G.S. Morishima and T.D. Cooney. 1984. Determining spawning escapement goals for wild coho salmon on the Washington North Coast. Pages 243-254 in: J.M. Walton and D.B. Houston (eds), Proceedings of the Olympic Wild Fish Conference. March 23-25, 1983, Port Angeles, WA.
This paper asserts that the accuracy of habitat quantity estimates and the classification of habitat by potential productivity have not been historically accurate and discusses the effects on maximum sustainable harvest policies.

Long, William A. 1975. Salmon Springs and Vashon continental ice in the Olympic Mountains and relation of Vashon continental ice to Fraser Olympic ice. US Forest Service unpublished report.

Nehlsen W., J.E. Williams and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16:2.
The American Fisheries Society (AFS) provides a list of Pacific salmon, steelhead and sea-run cutthroat stocks from CA, OR, ID, and WA to accompany the list of rare inland fishes reported by AFS in 1989.

Phinney, L.A. and P. Bucknell. 1975. A catalog of Washington streams and salmon utilization, Volume 2 - Coastal Region. Washington Department of Fisheries.
Outlines status of anadromous salmonids in WA and possible links to land use between land use and habitat degradation.

Schoonmaker, P., B. von Hagen and E. Wolf. 1997. The Rainforests of Home: Profile of a North American Bioregion. Island Press: Washington, D.C.
Describes the physical characteristics, history, economy and culture of the coastal temperate rain forest from Northern CA to AK. Presents a series of chapters from conservationists, ecologists, anthropologists and community developers.

Sheldon and Klein. 1994. Inventory of Western Clallam County Wetlands. In: Clallam County Comprehensive Flood Hazard Management Plan. Sheldon and Associates. Seattle, WA.

Smith, C. 2000. Salmon and Steelhead Habitat Limiting Factors in the North Washington Coastal Streams of WRIA 20. Prepared for the Washington Conservation Commission, Olympia, WA.
As part of ESHB 2496, the habitat conditions of salmonid-producing watersheds within WRIA 20 are reviewed and rated in this document. Maps of updated salmon and steelhead trout distribution, culverts and other blockages, large woody debris (LWD) and riparian conditions, and floodplain complexes were prepared and are located in a separate electronic file on this disc. This first round report examines salmon and steelhead trout habitat conditions. The streams addressed in this report include all salmon- and steelhead-producing streams in the following basins: Waatch, Sooes, Ozette, Quillayute, Goodman, Mosquito, Hoh, Cedar, and Steamboat.

Tabor, R.W. and Cady, W.M. 1978. The Structure of the Olympic Mountains, Washington – Analysis of a Subduction Zone, USGS Professional Paper 1033.
Geologic map of the Olympic Peninsula, Washington.

USDA Forest Service, 1994. Olympic National Forest Watershed Improvement Needs Inventory.

An inventory of over 200,000 acres was conducted on the Forest. This Watershed Improvement Needs Inventory (WIN) is used to identify existing and potential problem areas, evaluate them and recommend restoration action. Inventory data is used as part of the watershed assessment process which evaluates the current condition and health of watersheds. The Inventory helps to prioritize areas within a watershed to concentrate restoration efforts for greatest efficiency.

Washington Department of Fisheries and Western Washington Treaty Indian Tribes. 1992 Washington state salmon and steelhead stock inventory (SASSI). Washington Department of Fisheries, Olympia, WA.

This report documents the results of an initial stock status inventory that is the first step in a statewide effort to maintain and restore wild salmon and steelhead stocks and fisheries. Overall objectives and future steps of the restoration initiative are briefly described. The report primarily focuses on current condition of Washington's naturally reproducing anadromous salmonid populations and not on the adequacy of current resource management objectives.

Watershed Analysis

Watershed Analysis is a structured approach developed by the Washington Department of Natural Resources as a result of the 1987 Timber/Fish/Wildlife Agreement. In 1991, the Forest Practices Board proposed adopted the Watershed Analysis process as which develops forest practices plans tailored to each watershed based on scientific understanding. As part of the state process, Washington has been divided into roughly 800 watersheds which range between 10,000 and 50,000 acres, termed Watershed Administrative Units (WAUs).

In watershed analysis, the scientists first develop information and interpretation of resource conditions at a watershed scale. These reports identify sensitive areas and describe the nature of the sensitivity. In theory, standard forest practices will be applied to less sensitive areas and managers will address sensitive areas so that cumulative effects do not occur. Once the sensitive areas are identified, the field manager team will develop prescriptions for the area.

The products in a watershed analysis include:

- *Resource condition reports describing the condition of the watershed*
- *Maps of sensitive areas requiring prescriptions*
- *Casual Mechanism reports describing the sensitive area and nature of the potential problems*
- *Rule calls based on resource vulnerability that determine standards of performance for the rule call*

Field managers will produce:

- *Prescriptions with justification for each mapped sensitive units*

The following modules and components are compiled to create a watershed analysis:

Mass Wasting - sediment sources, mass wasting potential, mass wasting processes, mass wasting features, sediment delivery potential, effects of forest management activities on mass wasting, and slope instability

Surface Erosion – Hillslope and Road Erosion – erosion potential, contributing activities, sediment delivery, sensitivity to forest practices, baseline sediment levels

Hydrologic Change - hydrologic conditions, historic patterns of peak flows, disturbance effects on peak flows, effect of vegetative cover on runoff, changes in flood peaks associated with runoff

Riparian Function – historical and current riparian conditions and ability to supply LWD, dominant processes by which LWD is added to system, ability for riparian zone to supply LWD in the near term and long term
Stream Channel –channel response types, historic conditions, active channel geomorphic processes, responses of reaches to inputs, dominant channel processes

Fish Habitat – distribution and abundance of salmonid fish species, areas of degraded habitat by species and life history stage, areas of high existing and potential use by species and life history stage, areas of limited habitat availability

Water Quality – vulnerability of waterbody parameters to changes in inputs, current and historic water quality, changes between current and historic water quality that indicated vulnerability, sources of vulnerability (sediment, nutrients, heat , etc) that may establish sensitivity

Wasserman, L.J., C.J. Cederholm and E.O. Salo. The impact of logging on benthic communities in selected watersheds of the Olympic Peninsula, Washington. Fisheries Research Institute, School of Fisheries, University of Washington, 1984.
This study compares benthic populations, habitat parameters and management activity in 25 streams (including sites in the Dickey, Calawah, Bogachiel and Hoh basins). Positive correlation was found between certain species of benthic invertebrates and habitat parameters although no differences in populations could be related casually to logging.

Weitcamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon and California. National Oceanic and Atmospheric Administration, Technical Memorandum NMFS-NWFSC-24.
This report summarizes biological and environmental information gathered in the 1993 status review, brought about by petitions seeking protection for coho salmon under the Endangered Species Act.

Wiggins, W.D., G.P. Ruppert, R.R. Smith, L.L. Reed, and M.L. Courts. 1998. Water Resources Data Washington. Water Year 1997. US Department of Interior, US Geologic Survey Water Data Report WA-95-1. Prepared in cooperation with the State of Washington and other agencies. Tacoma, WA.

Ozette

Abbe, T, S. Fisher, M. McBride and A. Ritchie. 2002. The effects of Ozette River logjams on Lake Ozette: Assessing historic conditions and the potential for restoring logjams. Prepared by Philip Williams & Associates for the Makah Tribe.
This report is contains the first two phases of a continuing study of the Ozette River logjam study. The first two phases include a compilation of existing data records, an outline of general methods used to predict the hydraulic effects of logjams, a steady-state backwater model of the Ozette River for the reach immediately downstream of the lake, and an evaluation of probable effects of different types of logjams on Ozette River surface elevations.

Beauchamp, D., M. LaRiviere, and G. Thomas. 1995. Evaluation of competition and predation as limits to juvenile kokanee and sockeye salmon production in Lake Ozette, Washington. N. Am. J. of Fish Mgt. 15:193-207.
Examines the spatial and temporal patterns of feeding, distribution and the relative abundance of potential predators and competitors of juvenile kokanee/sockeye salmon.

Blum, J.P. 1988. Assessment of factors affecting sockeye salmon (*Oncorhynchus nerka*) production in Lake Ozette, WA. MS Thesis, University of Washington.
Author examines the relationship between destabilized tributary incubation and rearing habitats and forestry activities in the basin. Presents evidence that road building and clearcutting has affected the frequency and magnitude of peak flows, stream bed scouring, and the input of excessive amounts of inorganic and organic materials, thereby degrading water quality. Author also uses the Plankton Acre Index model to estimate the productive potential of the lake.

Bortleson, G.C. and N.P. Dion. 1979. Preferred and observed conditions for sockeye salmon in Ozette Lake and its tributaries, Clallam County, Washington. United States Department of the Interior, U.S. Geological Survey. Water-Resources Investigations 78-64. Tacoma, WA.
This report examines conditions in the Lake Ozette system for the 1976-77 seasons which would affect sockeye salmon. This includes discharge for the Ozette River, Big River and Umbrella Creek, gravels from Big River and Umbrella Creek, temperatures for the lake and all tributaries and chlorophyll levels in the lake.

Crewson, M., J. Freudenthal, P. Gearin, M. Haggerty, J. Haymes, J. Meyer, A. Ritchie, and W. Sammarco. 2002. Lake Ozette sockeye Limiting Factors Analysis. DRAFT. Prepared as part of the Lake Ozette Steering Committee.
From 1999 through 2000, stakeholders from the Lake Ozette Steering Committee formed a habitat workgroup to study and discuss limiting factors to sockeye production in Lake Ozette. Among the limiting factors discussed are predation, habitat, water quality, tidal prisms, disease and flows.

Dlugokenski, C., W. Bradshaw, and S. Hager. 1981. An investigation of the limiting factors to Lake Ozette sockeye salmon production and a plan for their restoration. U. S. Fish and Wildlife Service, Fisheries Assistance Office, p.52.
This report summarizes the status of Lake Ozette sockeye from 1977 to 1979 following attempts in 1976 to improve sockeye passage to Lake Ozette by removing jams in Ozette River. Biological characteristics are summarized and specific habitat degradation is noted.

Haggerty, M. 2004. Data summary of Lake Ozette tributary habitat conditions. DRAFT. Prepared for the Makah Indian Tribe, Neah Bay, WA.
In effort to help understand the spatial distribution of anadromous fish and the limiting factors in the tributaries to Lake Ozette the Makah Tribe implemented a detailed field investigation of baseline habitat conditions. The primary objective of this report is to summarize and analyze the field data collected by the Tribe in 1999 and 2000. Where possible data from previous studies and habitat inventories is integrated with data collected as part of this project to assess habitat conditions. The specific products included in this report and accompanying datasets include: edited and formatted data for each stream surveyed, channel dataset including 51.6 miles (83.1 km) of summarized channel data, LWD dataset including 30,326 pieces of LWD, integrated LWD-habitat dataset summarizing LWD and pool conditions for 38.3 miles (61.6 km) of stream, and maps.

Hughes, K.M., M.J. Crewson, and A.C. Ritchie. 2002. FY-2001 Hatchery Reform Phase II Telemetry Study of Lake Ozette Sockeye. Makah Fisheries Management, P.O. Box 115, Neah Bay, WA 98357. Unpublished report, p. 6.

Jacobs, R., G. Larson, J. Meyer, N. Currence, J. Hinton, M. Adkison, R. Burgner, 1996. Information Summary: The sockeye salmon *Oncorhynchus nerka* population in Lake Ozette, Washington, USA. US Dept. of the Interior, National Biological Service, Forest and Rangeland Ecosystem Science Center.
Authors present an information summary as a precursor to a meeting to discuss research and management options for the species in Lake Ozette Basin. Includes a historical summary of known information about the species, biological characteristics of the fish, recent population numbers at various life stages, and some habitat information.

Kidder, J.S., and M.G. LaRiviere. 1991. Lake Ozette Sockeye Salmon Enhancement Facility Feasibility Report. Prepared for the Makah Tribe by Chinook Engineering, Mukilteo, WA.
Inspects proposed sites and biological criteria for a sockeye enhancement facility proposed within the Ozette Basin. The report includes costs, engineering design, environmental considerations within the area.

Kramer, R. 1953. Completion report by stream clearance unit on Ozette and Big Rivers April, 1953. Prepared for the Department of Fisheries, Olympia, WA.

This report documents the stream clearing activities of 1953 on Ozette River and Big River. The report includes observations of logging along the banks and descriptions and locations of the jams that were removed.

Makah. 2000. Lake Ozette Sockeye Hatchery and Genetic Management Plan - Biological Assessment, Section 7 Consultation. October 23, 2000. Prepared by Makah Fisheries Management for Bureau of Indian Affairs. Makah Indian Tribe. Neah Bay, WA. p. 219.

McHenry, M., D. Morrill, and E. Currence. 1994. Spawning gravel quality, watershed characteristics and early life history survival of coho salmon and steelhead in five north Olympic Peninsula watersheds. Lower Elwha S'Klallam Tribe and Makah Tribe, Port Angeles and Neah Bay, WA. 59 pp.
This paper evaluates the effects of managed and natural watershed characteristics on salmonid spawning gravel quality and early life history in five north Olympic Peninsula watersheds including the Ozette watershed. The authors positively correlate land use with stream geometry. The study also found that there is a significant threshold for fine sediment above which the chances of salmonids surviving are low.

McHenry, M., J. Lichatowich, R. Kowalski-Hagaman. 1996. Status of pacific salmon and their habitats on the Olympic Peninsula, Washington. Report to the Lower Elwha S'Kallam Tribe, Port Angeles, Washington.
Status report based on a full literature review. Watersheds in WRIA 20 covered include the Hoh and Ozette sub-basins.

Meyer, J. and S. Brenkman. 2001. Status report on the Water quality of Lake Ozette and Potential Human-related impacts to salmonids. Olympic National Park, Port Angeles, WA.
Physical, biological and chemical characteristics of Lake Ozette and water quality in six tributaries to the lake were described from 1993-1994. The annual range of water quality conditions were measured for waster temperature, specific conductance, turbidity, and pH at four locations on the lake, six tributary streams and at the lake outlet. Water quality conditions in the lake were generally favorable to salmonids while conditions in tributaries were less favorable. The authors surmise that degraded water quality in these streams appeared to result from timber harvesting which began at the turn of the century and persisted through the 1970s.

Smillie, G.M. 2001. National Park Service trip report on Lake Ozette. Draft Unpublished.
This report documents a trip to Lake Ozette in which author reports observations of lake condition (sediment, lake level) and hypothesizes role of historic and current LWD on flow regime and shoreline processes.

<u>Sooes/Wa'atch</u>

Zajac, D. 2002. An assessment of anadromous fish habitat use and fish passage above Makah National Fish Hatchery in the Sooes River. U.S. Fish and Wildlife Division of Fisheries and Watershed Assessment, Lacey, WA.
This paper presents options and recommendations regarding anadromous fish use of the upstream habitat currently blocked by the Makah National Fish Hatchery in the Sooes River. The current condition of the upstream habitat (estimated to be about 25 miles of potential habitat) is also summarized.

Heckman, J.L. 1964. Reconnaissance Report: Fisheries Management Program, Makah Indian Reservation. Prepared by the United States Department of the Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Branch of Fishery Management Services, Olympia, WA.
This report is a result of meeting and field investigations during 1964 with the Makah Tribe over the issue of establishing an effective fisheries management program on reservation streams on streams outside the reservation on which Indians have historically fished. The report briefly comments on conditions of habitat parameters derived primarily from aerial photos.

Quillayute (general)

Chitwood, S. 1981. Quillayute River navigation project. US Army Corps of Engineers Technical Report.
Draft environmental impact statement including operations and maintenance information on inland navigation on the Quillayute River.

Decillis, P. 1991. Summary of data collection and habitat conditions in the Quillayute River system, 1990-1991. Quileute Natural Resources Department, Quileute Indian Tribe, LaPush, WA.

Fretwell, M.O. 1984. Quality of Water, Quillayute River Basin, Washington. US Geological Survey. Water Resources Investigations. Report 83-4162.
Documents 3 years of streamflow, sediment discharge and water quality data for the main rivers (Soleduck, Bogachiel and Dickey) in the Quillayute River Basin.

Nelson, L.M. 1982. Streamflow and sediment transport in the Quillayute River basin, Washington. US Geological Survey Open-File Report 82-627.

QNR. 1992. Summary of habitat conditions in the Quillayute River system, 1990-91. Unpublished

Dickey

Bretherton, K., D. Christensen, and T. Taylor. 1998. Riparian Function Assessment. In E/W Dickey Watershed Analysis Draft Report. Pentec Environmental, Inc. Edmonds, WA.
See Watershed Analysis Description

Dieu, J., K. Kreuger and P. Vanderhoof. 1998. Unpublished Water Quality Module. In E/W Dickey Watershed Analysis.
See Watershed Analysis Description

Haymes, J. and E. Tierney. 1996. Supplementation of wild coho smolt production in the Dickey River drainage, Washington. Final report to the Northwest Indian Fisheries Commission, Olympia, WA.

Jackson, R. 1998. Hydrology. In E/W Dickey Watershed Analysis Draft Report. Prepared for the Washington Department of Natural Resources.
See Watershed Analysis Description

LaManna, J., J. Dieu, and C. Cahill. 1998. Sedimentation Assessment. In E/W Dickey Watershed Analysis Draft Report. Prepared for the Washington Department of Natural Resources.
See Watershed Analysis Description

Martin, D., T. Powell, D. Netnon, E. Tierney and E. Patino. 1998. Fish Habitat Assessment. In E/W Dickey Watershed Analysis Draft Report. Pentec Environmental, Inc. Edmonds, WA.
See Watershed Analysis Description

Samuelson, C.E., E.G. Hoffman, and S. H. Olsen. 1982. Effects of current logging practices on fish habitat in five western Washington streams. Prepared for ITT Rayonier, Shelton, WA.
Examines the effects of logging on biological (fish and benthic populations), physical (stream temperatures and spawning area sediments), and chemical (dissolved oxygen) components in two sub-basins in the Dickey Watershed, Coal Creek and Skunk Creek.

QNR. 1993. Quileute Natural Resources, Water Quality Monitoring Program. Unpublished Data.

QNR. 1994. Quileute Natural Resources, Water Quality Monitoring Program. Unpublished Data.

QNR. 1995. Quileute Natural Resources, Water Quality Monitoring Program. Unpublished Data.

QNR. 1992. Quileute Natural Resources, Water Quality Monitoring Program. Unpublished Data.

QNR. 1992. Summary of habitat conditions in the Quillayute River system, 1990-91. Unpublished.

Sol Duc

Chesney, C. 1996. Channel Morphology. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

Christensen, D. 1996. Riparian. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

Jackson, R. 1996. Hydrology. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

Naughton, B. and M. Parton. 1996. Fish Habitat. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

Olympic National Forest. 1992 USFS Region 6 Channel Surveys, Soleduck Ranger District. Olympia, WA.
See below

Olympic National Forest. 1994 USFS Region 6 Channel Surveys, Soleduck Ranger District. Olympia, WA.
The class I, II, and most III streams were determined from streams surveys which were done in the late 1970's and 80's. It has been updated when there has been new information gathered during field review of proposed activities on the Ranger Districts. Many of the class IV and some class III streams have not been verified on the ground and were delineated from aerial photographs. Data was Manuscripted onto PBS (old) Quadrangles at 1:24000 by District Personnel. Data was then Digitized under contract by Vestra resources INC, Redding CA in 1998.

Parks, D. and R. Figlar-Barnes. 1996. Water Quality. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

Plotnikoff, R.W. 1998. Stream Biological Assessments (Benthic Macroinvertebrates) for Watershed Analysis: Mid-Sol Duc Watershed Case Study. Prepared for the Department of Ecology Publication No. 98-334. Olympia, WA.
Benthic macroinvertebrate communities were evaluated on Upper Bockman, Lower Bockman, Upper Kugel, Lower Kugel and Littleton Creeks within the Sol Duc watershed.

The vulnerability of these communities was assessed in regard to sedimentation, stream temperature and physical stream change.

Sasich, J and J. Dieu. 1996. Mass Wasting. In Sol Duc Pilot Watershed Analysis. Washington State Department of Natural Resources, Olympia, WA.
See Watershed Analysis Description

North Fork Calawah

Benda, L. 1996. Stream Channel Assessment. In North Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Dieu, J. and B. Shelmerdine. 1996. Sedimentation Assessment. In North Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Jackson, R. 1996. Hydrologic Change Assessment. In North Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Martin, D., P. De Cillis, and J. Haymes. 1996. Fish Habitat Assessment. In North Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

O'Connor M.D. and T.W. Cundy. 1993. North Fork Calawah watershed condition survey: landslide inventory and geomorphic analysis of mainstem alluvial system. Prepared for US Dept of Agriculture Forest Service, Olympic National Forest, Olympia, WA.

Springer, J. 1996. Riparian Function Assessment. In North Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

South Fork Calawah and Sitkum

DeCillis, P. 1998. Fish Habitat. In Stikum and South Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Lasorsa, D. 1998. Riparian. In Stikum and South Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Lingley, L. 1998. Mass Wasting. In Stikum and South Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Stoddard, R. 1998. Hydrology. In Stikum and South Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Wilson, S. 1998. Channel. In Stikum and South Fork Calawah Watershed Analysis. Olympic National Forest, Olympia, WA.
See Watershed Analysis Description

Bogachiel

Hanell, C. 2003. Mass Wasting and Surface Erosion Inventory for the Middle Coast Landscape, Olympic Peninsula, WA. Prepared for the Olympic Region Department of Natural Resources.
This is a landscape level assessment of sediment sources on DNR-owned land within the boundaries of the Middle Coast Landscape (north of the Quillayute River to the Kalaloch). Initial sediment sources were identified through aerial photos and then field observed. Information was then digitized into GIS. This study is meant to complement earlier studies by Dave Parks (Middle Hoh watershed analysis mass wasting module), Jack Powell (Middle Hoh watershed analysis surface erosion module) and Wendy Gertsel (Deep-seated landslide inventory of west-central Olympic Peninsula).

Quileute Natural Resources. 2000-2003. Bogachiel stream surveys. Unpublished data.
In FY 2000 the Quileute Tribe surveyed the Bogachiel mainstem for blocked culverts and cross drains. The process was continued in detail with the tributaries in FY 2001-03: Weeden, Murphy and Maxfield Creeks. These were stream typed using the newly approved (4/01) Washington Administrative Code issuances for the Forest Practices rules—WAC 222-16-031. In FY 02 the tribe surveyed Mill, Grader, May, Dry and Bear Creeks.

Hoh

10,000 Years Institute. 2003. Hoh River Watershed Monitoring First Interim Project Report. Prepared for the Hoh Indian Tribe and the Northwest Indian Fisheries Commission.

Abbe, T. 1996. Geomorphological Survey of Hoh River Floodplain, RM 19, at the confluence with Elk Creek. Consultant report to the Hoh Tribe.

Blew, R.D., and R.L. Edmonds. 1995. Precipitation along an inland transect on the Olympic Peninsula, Washington. Journal of Environmental Quality, 24:239-245.
This study intended to examine the influences of ocean effect, seasonality and distance on the chemistry of precipitation falling on several sites in the Hoh River valley.

Brummer, C. J. and Montgomery, D. R., Downstream coarsening in headwater channels, Water Resources Research, 39(10), 1294, doi: 10.1029/2003WR001981, 2003.
Field data from four mountain drainage basins in western Washington (including a site on the South Fork Hoh River) document systematic downstream coarsening of median bed surface grain size (D_{50}) and a subsequent shift to downstream fining at a drainage area of about 10 km^2.

Cederholm, C.J. and W.J. Scarlett. 1997. Hoh River tributaries: salmon habitat survey report and recommendations for rehabilitation. Washington Department of Natural Resources, Olympia, WA.
This report is a detailed description of mainstem and subwatershed habitat conditions with substantial data appendices and recommendations.

Edmonds, R.L., T.B. Thomas, and R.D. Blew. 1995. Biogeochemistry of an old-growth forested watershed, Olympic National Park, Washington. Water Resources Bulletin, Paper No. 94019.
The West Twin Creek watershed was examined to determine (1) concentrations of major cations and anions and dissolved organic carbon in precipitation, throughfall, stemflow, soil solution, and the stream; (2) nutrient input/output budgets; and (3) nutrient retention mechanisms in the watershed.

Edmonds, R.L. and R.D. Blew. 1997. Trends in precipitation and stream chemistry in a pristine old-growth forest watershed, Olympic National Park, Washington. Journal of American Water Resources Association, 33:4, pp. 781-793.
The West Twin Creek watershed was examined to determine time trends in precipitation and stream chemistry and seasonal patterns in precipitation and stream chemistry.

Edmonds, R.L., R.D. Blew, J.L. Marra, J. Blew, A.K. Barg, G. Murray and T.B. Thomas. 1998. Vegetation patterns, hydrology, and water chemistry in small watersheds in the Hoh River valley, Olympic National Park. Scientific Monograph NPSD/NRUSGS/NRSM-98/02. US Department of the Interior, National Park Service.

Hallock, D. 2001. River and Stream Ambient Monitoring Report for Water Year 2000. Washington State Department of Ecology, Publication No. 01-03-042, Olympia, WA.
The DOE collected monthly water quality information at 88 river and stream monitoring stations as part of a long-term monitoring program. The only site within WRIA 20 was the Hoh River at the DNR campground and the data includes monthly temperature, flow,

conductivity, oxygen, pH, suspended solids, total nitrogen, ammonia nitrogen, nitrate nitrate, phosphorus, turbidity, and fecal coliform.

Hatten, J. 1991. Salmonid Life Histories of the Hoh River Basin. Prepared for the Hoh Tribe.
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APPENDIX B

BUREAU OF RECLAMATION WATERSHED CHARACTERISTICS METHODOLOGY

(TO BE PROVIDED BY BUREAU OF RECLAMATION)